

WHAT IS CLAIMED IS:

1. A control system for measuring a gap in an apparatus for pressing a traveling paper web, comprising:

a press apparatus and a support defining the gap therebetween;

a frame movably supporting the press apparatus;

an actuator operatively disposed between the frame and press apparatus for selectively moving the press apparatus toward and away from the support to control the gap size;

a sensor mounted in one of the press apparatus or support for producing a signal indicative of the pressure on the paper web as the paper web and the at least one belt or felt are passed through the gap beneath the sensor;

a controller operatively linked with the sensor for receiving the signal, determining the measure of the gap as a function of the pressure, and causing the actuator to move the press apparatus to control the gap size.

2. A control system for measuring a gap as set forth in claim 1, wherein the belt is interposed between the paper web and the press apparatus; and the press apparatus includes an air chamber for applying pressurized air to the belt.

3. A control system for measuring a gap as set forth in claim 1, wherein said sensor comprises a transducer.

4. A control system for measuring a gap as set forth in claim 2, wherein the press apparatus includes leading and trailing arms; a seal is mounted on a distal end of at least one of the leading or trailing arms for contacting the at least one belt or felt in nipping engagement

therewith; and a transducer is mounted in the seal of at least one of the leading or trailing arms for producing signals indicative of the gap between the press apparatus and the support.

5. A control system for measuring a gap as set forth in claim 1, wherein the support means comprises a rotatable support roll having a cylindrical support surface; and the press apparatus includes a seal which has an outer surface contoured to substantially conform with the support surface of the support roll.

6. A control system for measuring a gap as set forth in claim 1, wherein the actuator comprises at least one flexible tube capable of expanding or contracting upon being linked with a source of pressurized air to selectively apply force to move the press apparatus to control the gap size.

7. A control system for measuring a gap as set forth in claim 6, wherein the press apparatus includes a seal for contacting the at least one belt or felt in nipping engagement therewith.

8. A control system for measuring a gap as set forth in claim 7, wherein the seal has an outer surface for engaging the at least one belt or felt, the seal outer surface being contoured to conform with the support.

9. A control system for measuring the gap as set forth in claim 8, wherein the seal outer surface is curved to be cylindrical with a radius of curvature at least as large as the radius of curvature of the support roll surface.

10. A control system for measuring a gap as set forth in claim 1, wherein the paper web is disposed to travel between a belt and a felt; the support means comprises a support roll having a roll surface; the press apparatus includes a seal having a surface curved for engaging the belt

Sub A 90  
over the support roll surface; and the sensor includes a transducer operatively mounted in the seal curved surface for engaging the belt and producing a signal indicative of the gap between the seal surface and the support roll surface as the belt, paper web and felt are passed therebetween.

Sub B3  
11. A control system for measuring a gap as set forth in claim 10, wherein the pressure transducer is coupled with a controller, which in turn is coupled with a source of pressurized air whereby the controller controls said source of pressurized air to provide a predetermined air pressure as a function of the pressure transducer signal to produce a corresponding force in the pressing apparatus and seal to maintain the gap at a predetermined size as measured by the pressure transducer.

Sub C 10  
12. A control system for measuring a gap as set forth in claim 1, wherein:  
the press apparatus includes a controlled deflection roll having a center support shaft and a hollow cylindrical roll shell rotatably disposed about the support shaft and at least one pressure shoe for providing pressure between the support shaft and the roll shell for modifying the gap by controlling the deflection of the cylindrical roll shell;

the support means includes a support roll having a cylindrical surface for supporting the paper web and the at least one belt or felt thereon; and

the sensor includes at least one transducer mounted in the support roll surface.

Sub C1  
13. A control system for measuring a gap as set forth in claim 12, further including:  
a plurality of transducers arrayed in the surface of the support roll longitudinally of the support roll for providing signals indicative of the gap at corresponding locations in the cross-machine direction.

Sub A12  
14. A control system for measuring a gap as set forth in claim 12, wherein:

the at least one pressure shoe is operatively linked with the controller;

the sensor comprises a plurality of transducers mounted in spaced array longitudinally along the length of the support roll surface; each said sensor operatively linked with said controller, whereby signals from the specific ones of the transducers result in changes in force supplied to a corresponding pressure shoe to modify the measured gap at a specific location along the pressure nip line of contact between the controlled deflection and support rolls, as desired.

15. A control system for measuring a gap and apparatus for pressing a composite web comprising a paper web disposed between a co-traveling belt <sup>and</sup> or felt on either side of the web as <sup>paper</sup> the composite web travels through the gap, the apparatus comprising:

a controller;

a pressure source;

a controlled deflection roll having a center shaft and a hollow cylindrical roll shell disposed for rotation about the center shaft, the controlled deflection roll further having a plurality of end-aligned shoes mounted on the center shaft for supporting and applying pressure to the roll shell against the inner cylindrical surface thereof;

10 a support roll mounted in opposed array with the controlled deflection roll such that the gap is formed between the controlled deflection and support rolls as the composite web is passed in the nip therebetween;

a plurality of transducers mounted in the support roll surface for measuring the gap beneath each transducer, each of the transducers linked to the controller to provide signals  
15 indicative of the gap over a specific transducer;

the pressure source is operatively linked to individual shoes for providing power to move the shoes relative to the center shaft;

the controller is operatively linked with the pressure source to actuate individual shoes responsive to signals received from corresponding transducers indicative of gap measurement at a corresponding location along the nip between the controlled deflection roll and support roll.

16. A control system for measuring a gap in an apparatus for pressing a traveling paper web disposed between a co-traveling belt and felt on either side thereof as the paper web, belt and felt travel through the gap, the apparatus including press apparatus and a support defining the gap therebetween, comprising:

a frame for movably supporting the press apparatus;

the support includes a roll having a cylindrical surface;

the press apparatus includes an air pressure chamber having leading and trailing arms disposed to engage one of the belt or felt to seal the air pressure chamber thereagainst;

a pressure source for providing pressurized air to the air pressure chamber for providing pressing force to the web as the web passes beneath the air pressure chamber over the support roll surface;

a sensor attached to at least one of the leading or trailing arms at the interface between the at least one arm and the felt or belt over the surface of the roll for producing a signal indicative of the pressure on the web as the web is passed <sup>under</sup> over the transducer;

a controller operatively linked with the at least one sensor for receiving the signal, measuring the gap and selectively causing increasing or decreasing pressure on the press apparatus to control the gap.

